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Teaching and Learning in the 21st Century: An Overview

Johan Eddy Luaran, Jasmine Jain, Roslinda Alias, Roslani Embi, Zawawi Temyati

Abstract: The proliferation of computers coupled with internet access placed a fundamental change to the history of humankind and United Nation report has recently declared that Internet access is a human right (United Nations, 2016). Technological devices not only changed the way we communicate with each other, but reshaped the way we lead our life on a daily basis to a point it becomes a necessity to the major global population. As educators, the questions that often we ask are: What effect do these technological devices bring to teaching and learning? How would it affect the way I teach and learn?

INTRODUCTION

The review on what have been done in the local research scene suggests that the potential of technology in leveraging learning is well-recognized. Through a review done and reported by UNESCO (2012), Malaysia has been identified as among the first few countries to have pioneered an ICT plan into its education system strategy. Ministry of Education Malaysia has provided an “interesting array” (UNESCO, 2012) of plans and policies developed since 1990. Among them are Smart School Roadmap and the Policy on ICT in Education 2010. Similarly, the recognition that technology is transforming learning is also acknowledged in the Malaysia Education Blueprint for Higher Education for year 2015-2025. One of the 10 shifts is dedicated to Globalised Online Learning, specifically placing blended learning models as a staple pedagogical approach in all Higher Learning Institutions in Malaysia (Ministry of Higher Education, 2015). All these efforts in crafting the policy are more ambitious than just using technology in teaching, but it changes the whole framework of pedagogy in the higher level of education.

This chapter provides an overview of teaching and learning in the 21st century, specifically on the areas of heutagogy, gamification and Massive Open Online Courses (MOOC), and the subsequent chapters will draw

specific examples from the Higher Education scenes. This overview first discusses about how learners are viewed in the 21st century.

LABELLING THE LEARNERS

For almost past half century, learners have been labelled according to the generations that they are borne in. The roots of categorizing 21st century learners can be traced back to these labels, where they started with The Baby Boomers, Generation X, Generation Y, Generation Z and Generation Alpha (α). Of these labels, the students who are currently in schools and colleges are those of Gen Z. It is of specific importance that we review the features of these students in order to know of its repercussions by determining what the students know and how they should be guided in teaching and learning.

Generation Z is defined as babies born in 1970s and 1990s, who are also commonly identified as The Millennials and digital natives, based on their dependence upon technology (Prensky, 2006). These digital natives grow up with a world which is largely influenced by the World Wide Web as they are born after the invention of microcomputer. The term “digital native” was first coined by Prensky (2006) when he observed that the school is still teaching in the 20th century while the students are already rushed into the 21st century. He calls for reinvention of teaching and learning in school to make education relevant for the 21st century students. Digital natives, has been described as fluent in using and acquiring new technology, and the usage is almost intuitively where it has been akin to be “an extension of their brains” (Black, 2010, p.95). This is understandable as they are exposed to various media like watching Sesame Street when growing up, and then to MTV when they are teenagers, and continue having easy access to microcomputers and phones with internet access. Hence, they are accustomed to communication via social media, catching up on television show via online stream, blogs, microblogs and thrive on instant gratification that these technologies are able to provide them with.

With so much participations in online conversation and digital activities, it might seem that this generation prefer physical isolation, but it was observed that they work well when they are collaborating with other people. They are also comfortable and actively contributing to curating digital content in

the Internet. Throughout the centuries, the role of technology in teaching and learning has been rapidly evolving. Skinner (1954, p.97) declared that human are always on the “brink of change” and extensive revision on practices need to constantly take place to adjust to these changes. The changing environment and exposure of technology usage resulted in the ways of thinking and processing information which are different from past generations. Woods (2006) believes that the human brain’s digital input has rewired it, helping it to respond faster, sieve information, and recall less. Yet, despite the differences in these Digital Natives’ learning, it is still recognizable as Prensky (2006, p. 10) stated, “[T]hey’re already busy adopting new systems for communicating (instant messaging), sharing (blogs), buying and selling (eBay), exchanging (peer-to-peer technology), creating (Flash), meeting (3D worlds), collecting (downloads), coordinating (wikis), evaluating (reputation systems), searching (Google), analyzing (SETI), reporting (camera phones), programming (modding), socializing (chat rooms), and even learning (Web surfing)”.

On the flipped side of a coin, the educators, who are commonly digital immigrants, tend to work in ways which worked for them decades ago when they were in school. As educators become more aware of the dynamic landscape of education and the different characteristics of the 21st century students, there need to be an understanding and actions on how best can the needs of today’s students be addressed.

21ST CENTURY TEACHING AND LEARNING

The attributes of learners are changing, notably from one generation to another catalyzed by the fundamental changes caused by the advancement in technology. These changes call for us to revisit how teaching and learning should be in the 21st century. This chapter presents the changes in teaching and learning in which transformation is taking its course. It would be apt to look at the changes done at the younger age of schooling and then progress to the older age to provide a landscape of dynamic educational endeavor occurring in Malaysia.

From 3Rs to 4Cs

The mission of education is to ensure that learners master the 3Rs in order to succeed in higher education and beyond. However, the 3Rs known as Reading, Writing (‘riting) and Arithmetic (‘rithmetic) are no longer sufficient in the 21st century world. Studies made by World Economic Forum (2016) showed that transformation in education needs to be embraced as 65% of learners entering schools will be upon graduating, working for jobs that is non-existing in today’s world. These research indicate that learners need to be equipped with all the necessary skills in order to survive and flourish in the 21st century when they graduate. The 21st century skills, also term 4Cs- Creativity, Collaboration, Critical Thinking and Communication are listed as staple skills learners need to develop and possess in order to prepare them for increasing complex life of the 21st century. In P21 framework of Learning in the 21st century, the 4Cs are placed under the category “Learning and Innovative Skills”, viewed by educators, parents, researchers and businesses as the set of skills vital for a student to be competent in their work life and beyond (P21, 2007a).

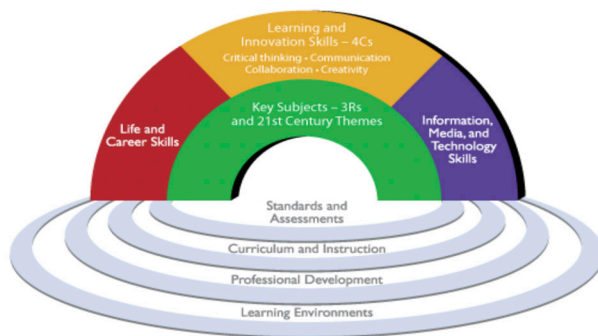


Figure 1: P21 Framework for 21st Century Learning (P21, 2007a)

a) Creativity: Creativity can be viewed as a skill where learners are able to think differently and involve creating worthwhile notions and ideas. This may involve working with others as well because thinking creatively may be an idea which is reevaluated and reflected by taking into account feedback from others. Creativity, as it generates something

new, may result in innovative endeavor or products. The Revised Bloom's Taxonomy by Anderson and Krathwohl (2001) has placed "Creating" as a Level 6 educational goals, where it demands high cognitive thinking for learners to be able to create, and it is viewed as a valuable educational goal to inculcate higher order thinking among learners. Educators are encouraged to incorporate such educational goals for their learners so that they may have platforms to train their mind and hone their skills for creative thinking.

b) Collaborations: In the most basic sense, collaboration refers to the ability to work well with others to achieve the common goal. Lai, DiCerbo and Foltz (2017) has listed three sub-components of a successful collaboration:

- i) Interpersonal communication, which refers to the ability and skills to communicate both verbally and non-verbally with teammates
- ii) Conflict resolution, which focuses on the skills and ability to acknowledge and resolve crisis for the best interest of the group, and
- iii) Task management, which concerns about the skills and ability to set goals and organize tasks to achieve that goals. This also requires the ability to track progress and re-adjust strategies along the way to meet the outcomes desired.

In a review by Lai, DiCerbo and Foltz (2017), it is noted that it is quite convenient for educators to break students into group of five in an assignment with the aim of honing collaborative skills among the students, but the students may end up dissecting the assignments into identical sub-parts and each member in the team work individually to complete each subparts assigned to each of them. Collaborative skill is one of the hardest skills to develop by teachers as it requires close monitoring that the students have achieved all the three sub-components in order to be an effective team player of a collaborative work.

c) Critical Thinking: The fundamental of critical thinking is basically ability to reason, both deductively and inductively to understand the nature of something. It also include the ability to use systems thinking where a person can analyze how parts of a whole system interact with each other to produce the specific outcomes in complex systems. Critical thinking is

different from creative thinking, as critical thinking demands evidences, deep analysis, evaluation of arguments and claims and subsequently ask significant questions which leads to solutions or ideas.

d) Communication: Communication skill not only involve the audible part when ideas are communicated, but it is a skill which also involve the ability to listen effectively to decipher meanings. In the 21st century, good communication skills also involve the use of multimedia and social network, to communicate responsibly and for a range of purpose. In conclusion, good communication involve the skill to articulate thoughts in verbal and nonverbal forms through various technological and non-technological forms and contexts.

Curriculum and Instruction of the 21st century

As learners co-construct understanding in a classroom of 21st century, a facilitator who generally scaffold and guide learners to understanding what they are learning can be an important figure. This facilitator, with the internet as a textbook, might not be able to explain and answer every questions asked regarding the content, but he or she should be able to teach how to search for reliable answers to the questions. In this example, it shows the need for ICT and Information literacy, in order to gain an understanding on the content aimed to be learned.

The first step to a 21st century instruction then, would include one of those skills as part of the learning outcomes of a lesson. In this way, it will create opportunities for the learners and teach the 21st century skills in a discrete manner while placing the key subjects as the context. The instruction of the 21st century also calls for innovative methods which approaches learning via the use of technologies. Hence, the learners are learning as active inquirers and engage their high order thinking skills. All these transformations can be done by tweaking the learning outcomes available, and map out class activities that are aligned to the outcomes.

The standards which then mapped into learning outcomes are evident in various documents, governed by the Malaysian Qualification Agency (MQA) for its qualities and standards. These discussion on embedding 21st century skills should not only be confined into instructions in a classroom, but also include the instructions done online. Instructors or teachers teaching

in an online environment should place a lot of emphasis in developing quality e-content for the same intention- teaching the key subjects while honing the 21st century skills. This is especially true with many educational institutions offering Massive Open Online Courses (MOOC), dedicated series of videos and tutorials to help learners from anywhere in the world to learn and in many cases, earn credits by demonstrating their understanding from learning the course.

With such huge intervention of technology in education scene, it demands students to be independent learners who are motivated to learn and engage with others meaningfully. Such demand of students also requires change of the teaching method. Pedagogy is no more relevant in teaching 21st century learners, but it is debated that teachers should embrace heutagogy which means self-determined learning. This is aligned with the change in learners that we aspire, where we want learners to acquire both capabilities and competencies (Blaschke, 2012). The subsequent subtopic will discuss in detail what heutagogy is, and how it is relevant in the 21st century.

Assessment of the 21st Century

The transformation in teaching and learning in the 21st century also is translated into the assessment practice. Assessment is a cornerstone of good teaching and learning, and it provides us information which inform us about whether the teaching and learning has been effective. Whether its standardized large scale assessment or classroom task used as part of students' assignment, assessment provides valid measures of students; understanding and navigate both teachers and students on what to improve on.

Over the past decades, assessment has a vital role in molding the educational policies around the world, including Malaysia. Summative assessment, for example, becomes a measure for University admissions and streaming of classes in higher level of secondary schools. Furthermore, the decreased weightage of final examination in each courses as suggested by Ministry of Higher Education and strengthen by Malaysian Qualification Agency (MQA) documents for higher education assessment encourage universities to rethink the way education is done, which partially led to

the revision of curriculum framework in the universities, incorporating a preset standard of knowledge, skills and values believed to be necessary for 21st century.

Hence, the assessment of 21st century looks beyond learners' ability to recall discrete knowledge but also demands an assessment on their 21st century skills needed to survive the increasingly global and technology-laden world by the time they leave universities. The strategies in assessing the students has to be shifted in order to assess and subsequently tell us whether a student is ready to meet the challenges of 21st century. The assessment then should not be measuring only discrete knowledge but a range of skills which students need to master such as critical thinking, collaborative skills, examining problems, gather and analyzing information while using appropriate technology. Another note that educators need to remember is that there should not be an ultimate answer to a task, but a range of solutions can be accepted. This reflects the subjective nature of the body of knowledge, and shift the focus on the process of arriving to a solution, rather than the accuracy of the solution itself.

It suggests a few pointers that 21st century assessment need to focus on. Effective feedback and feedforward for example, play a vital role in developing learners that are continuously striving to improve. Another pattern of assessment in the 21st century also showcases the need for students to document their learning digitally by archiving and reflecting their learning via developing e-portfolios to encourage deep learning. These portfolios would also inform instructors about their students learning, and used to demonstrate the mastery of 21st century skills to prospective employers.

HIGHER EDUCATION IN MALAYSIA

The role of education in promoting globalization or development has been much in discussion on different perspectives changing the social impact of the community on how some countries go about on free education, promoting compulsory education and many developed countries now boast 100 percent enrolment rates in primary school and an increase of access to secondary school (Orozco & Qin-Hilliard, 2004). Globalization in education can be seen from an economic perspective, which in many ways can be seen

as key factors as on creative thinking, critical thinking, skills and others pertaining to the rise of globalization. Higher education has become one of the most important sectors for globalization in the sense that it is widening, deepening and speeding up of all kinds of worldwide interconnectedness (Scott, 1998; King 2004; Marginson, 2006).

The higher education scene in Malaysia is an interesting and dynamic one- it never fails to keep up to the best ways teaching and learning can be done, by factoring in the various variable, namely the changing demographic of students, the enrollment of students who are considered as digital natives and the advent of technological advancement. These changes are also in line with how universities are viewed, namely from a corporation that served in disseminating knowledge to preparing society for the future workforce. The latter described how teaching and learning at this level, more intensely, need to focus on skills rather than content, as content is tentative and easily available in the now and in the future. Besides that, the traditional believe in treating all students the same is no longer relevant. The demographics of universities students are changing dramatically attracting more working adults to take up professional development courses, upskilling themselves so that they are more relevant to the workforce. Higher education have to meet the needs of these learners plus many other younger learners who are varied in terms of their age and experiences, placing policy makers, educators and stakeholder into contemplating how do we deliver more education with more options and with more quality, but with lesser cost incur.

MOOCS

Partial aspects of online education was introduced to help the working adults learn through what was labelled as distance education, and this slowly is changing how higher education institutions operate in order to meet the disparate needs of an increasingly diverse learner population. The latest trend in Malaysia Universities are to employ Massive Open Online Courses (MOOCs), as these courses can be made free for everyone and do not require lecture rooms, teaching assistants and heavy workload of the lecturers. This is because the common lecture could be easily duplicated for various times for different classes instead of increasing the workload of lecturer to repetitiously teach the same content depending on the classes

enrolled for the course in the traditional method. The same applies too for lecturers who is teaching same courses for every semester, where MOOC content can be readily made available for students to watch, and the lecturer can then focus on provided tailored-made tutorials to meet the learning needs of the students. Five public universities in Malaysia was placed under the Ministry of Higher Education's purview to implement fully MOOC courses for their niche programs via Open Learning, enabling access to education to everyone in and outside of Malaysia without a cost. There is also instances where learners are able to gain credit for the MOOCs they participated in and completed, which could lead to revenue generations for the university and the MOOC platform provider.

The critics of MOOCs however, is skeptical about this wave in education as they fear that such move may water down the quality of education. While a long-term sustainable model for MOOC is still questionable, many other educators are perplexed about how students are retained and assessed in MOOC. A report alleged that MOOCs typically has 90% drop out rate, with superficial learning occurring to the rest of the 10%. Although giving free education to thousands of people is a noble act, skeptics are not convinced that merely transmitting information via pre-recorded videos is education, because education does more than just that- it involves teacher teaching learners what to do with that information, how to acquire skills to look for information and mastering those skills for life after study. Many who are opposing MOOC as a mean for replacing authentic learning is also advocating that there is a big problem with assessment. The typical MOOC would provide a multiple-choice question or short-response question after 4 to 5 minutes of videos, which is viewed as rather ineffective assessment of learners' understanding.

As higher education and its entities evolve, it is expected that what happen in the classroom will change dramatically. Physical learning spaces perhaps will be shrink in terms of the frequency of usage as more and more classes are migrated online, and educators have to really think about how to put learners' skills into action, planning the content being learnt into a social context, and where accessibility to the instructor is always available to clarify any doubts about the learning.

While the discussion can go on debating about whether face-to-face or

online learning is more effective for learning, there is definitely a consensus on the significant advantage of technology in adding content processing by learner. Even a Youtube video can be paused, fast-forwarded, rewind and replayed- and all these are functions not present in traditional mode of lecture. Educators equipped with technology too can add in simulations, asynchronous discussions, and links for extended readings, while learners are able to self-assess their understanding of the topic. Another advantage of online learning is the duration needed to complete the program. With MOOC, prospective students do not have to wait until pre-requisite courses are offered in order to advance into the program and finish earlier. Even when there is shortage of manpower for teaching, the candidates can seamlessly enroll into the prerequisite MOOC courses, participate actively and complete the course with credit. For students who wanting to finish the program and apply for a better job, MOOCs seemed to be a good choice, especially for the digital natives who are used to individualized learning through various means simultaneously. Hence, the hope is to see a balanced blend of both online and face-to-face elements in MOOCs.

In the subsequent chapters, the development of MOOC, its acceptance and its challenges in Malaysian universities are shared to provide readers ideas on how the universities are coping with the advancement of technology and in the same time, keeping teaching and learning interesting and meaningful.

HEUTAGOGY

Part of the movement of the online education has been placing ample focus on MOOC because of the different ecosystem and environment it provides to learning compared to other online education alternatives. MOOC as the name suggest, is open to all and hence includes massive number of learners. Any educators would understand that this takes a different pedagogical model given the complexity of catering to the needs of diverse participants' interests and background. It is important to recognized learners' motivation and their purpose of presence in the MOOC courses to make them effective (Beaven et al., 2014; Clow, 2013; Downes, 2012). Such identification requires different type of pedagogical approach.

The first generation of pedagogical theory in the delivery of MOOC was

the cognitive behaviorism involving only content transmission, typically found in the one-to-many distribution model (Anderson & Dron, 2011). The delivery of such MOOC normally is done through lecture series, with integrated quizzes given in chunks to assess understanding and maintain focus to the content being taught. In more comprehensive cases, the process is also supplemented by articles, case studies and videos as extensions to enhance the learning (Agonacs & Matos, 2017). The design was thought to be insufficient as MOOC mature and spread, as researchers felt that such learning can be rather segregated and does not meet the diverse needs of the learners (Poplar, 2014). The second generation then, based on social constructivism started to emerge with more MOOC instructors integrating wide range of collaborative activities in their courses. According to Anderson and Dron (2011), social constructivism in MOOC allows each learners to “construct means by which new knowledge is both created and integrated with existing knowledge” (p.85). The basis of this theory emphasize on the communication and relationship with others in the process of learning in order to assimilate, accommodate and develop schemas (units of understanding) which may be similar or contradict with the previous experience that the learners has already construct for himself (Piaget & Inhelder, 2008). The practices translated from these beliefs then emphasize on socially-intensive activities, such as group discussions, group assignments and case studies as a group. The role of instructor, although active, is as a facilitator which provide the passage of learning.

The third generation of pedagogy, although shares the emphasis on both content and social context, it decenters the role of instructor as the one who directs and mediate the learning. Heutagogy, the theory of self-determined learning which is based on the “self-directed principles of andragogy” (Blaschke, 2012) but shifting the learning from self-directed to self-determination. The role of a teacher, is no longer a mediator of learning because learners own up their responsibilities of creating their own learning pathway. Learners set learning goals for themselves, choosing what they intend to learn and the method to learn them. Such characteristics develop the participants’ capability of becoming autonomous and reflective learners, solving increasing complex problem by leveraging on their networks and through it, grow their capacities for self-directed and lifelong learning.

With the presence of MOOC which is regarded as an “evolutionary

moment” (Daniel, 2014) for education and is the way forward, many researchers advocate that there is a need for a hybrid of different pedagogical design of MOOC, given that there is still a portion of learners who join a MOOC but find it challenging to work in a low structured context which required self-directedness in learning (Agonacs & Matos, 2017). Beaven et al. (2014) stated that heutagogic model requires three stages for it to be complete, namely moving from pedagogy to andragogy and then to heutagogy. Pedagogy stage allows learners who are not familiar with online environment to gain support through the instructor-led course structure. In a less structured level like andragogy stage, learners who are more mature then self-direct their learning with the instructor’s facilitations within the course framework. At the highest stage and with sufficient experience, learners then self-direct their learning path by self-determining their learning objectives. At this stage called Heutagogy, learners possess the highest degree of autonomy (Blaschke, 2012).

From the above discussion, we understand that heutagogy, although appear as a fitting model for the evolving facets of MOOCs, remains subjective to be applied to all types of courses using the MOOC environment. Considerations of blending all three stages of MOOC seems crucial to cater for the needs of diverse learners, who enter the course with wide variation in terms of their capabilities of learning in a structured and less structured ecosystems. With this gap, researchers in the US have suggested few hybrid models to their MOOC, blending both community and task-based designed to their MOOC (Anders, 2015).

With so many advancement and tractions in the development of pedagogies in MOOC learning, this dynamic scene is going to be interesting to explore to see if it fits the local education context. The attempt to review and share the experience of using heutagogy as a pedagogical model in the online learning environment will be extended in the subsequent chapters of this book, where the applications will be made more relevant in the context of local higher education scene.

GAMIFICATION

Besides MOOC and the different pedagogical models of MOOC, infusing learning with games seemed to be in the forefronts of creative ways in getting learners learn. Gamification is defined as the gaming mechanics placed in a non-game context, to increase motivation and engagement. The term gamification has been coined by Marczewski (2012), where the concept gamification was used previously only in the commercial area to incentivify customers who visit an outlet frequently by providing them with levels, badges, points or titles (Zichermann, 2011; Deterding 2011). In the recent Horizon report by Johnson et al. (2014), gamification is viewed as a significant development in higher education. However, game based learning predates the digital age by centuries where games such as board games, puzzle games and physical games were being used to keep learners motivated in learning. This is also consistent with what many theorists claimed n saying that learning through play is a staple component for cognitive development for a child (Vygotsky, 1962).

In a more recent years, gamification has landed itself in a more concrete position in encouraging learning due to the advent of mobile phones and internet. Many experts recognized the unique characteristics of games which assist in making learning more engaging for learners. Sandford (2005) claimed that the thematic and narrative threads existing in games allow players to have different identities with different range of characters or Avatars, with which they can build more socially sensitive and emphatic identities while interacting with other gamers. Besides that, the element of experimentation allows players to take risk in testing out several course of action and subsequently able to experience a range of different outcomes as a result of their decision-making. Games also allow players to be increasingly able to make decisions involving complex environments and learn from those experiences. As a result of these characteristics that games possess, players are provided with the opportunities to improve their motivation and engagement, both intrinsically and extrinsically. More importantly, games provide “edutainment”, highlighting the symbiosis of enjoyment and learning.

In the arena of higher education, more works have been done to reap the benefits that gaming have to offer. Institute for the Future, for example, is

designing games that foster participation and harvest ideas from other about sustainability in education and health contexts. In another setting in New Jersey, digital simulations is also used to reinforce learner's understanding about certain business models through an application in a mock real world scenarios. Through an online business simulation, learners are challenged to plan and execute a business strategy which addresses the problem given to them. Gamification can also be seen in online learning environment such as on the university learning management systems. Students are awarded with badges and points with their successful attempt on each work assigned by their instructor, seen as Awards for completing missions. These badges can also be associated to their social network profiles such as LinkedIn and Facebook, which furnish the learners with greater sense of accomplishment and recognition.

From the literature and from the local cases as reported in the complied cases under the theme Gamification in this book, there is no doubt promising results on applying gamification into teaching and learning in higher education. With more availability and adoption of technology as well as how more universities are shifting to the Bring Your Own Device (BYOD) practice, gamification will be an easier approach to be incorporated into meeting the learning objectives. However, educators should be aware that mere introduction into lessons is not necessarily effective for a lesson to be meaningful and engaging. Educators should take time to introduce games into lesson planning in a way that it guides the structure of the classrooms. Besides that, educators also need to be consistent in the way pedagogical approach is used in each lesson as routine can become ineffective over time, by which students will no more be motivated by the approach.

CONCLUSION

This chapter reviews the need for transformational teaching and learning to meet the demands of increasingly complex 21st century. The discussion centers on how the infusion of technology in the society changes various aspects of human lives, including the growth of a child in a family and his pattern of learning. The challenges that individuals who leaves school in the 21st century are very different and it is the role of education to prepare them to meet and thrive in these challenges. The preparation here does not

just involve good academic and soft skills, but also the cultivation of various 21st century skills- the 4Cs and various literacies. As we move further into 21st century, the institutions of higher education will need to reassess their priorities and deploy technologies in the right circumstances. When this is done right, online learning can keep institutions of higher learning to be relevant to the new types of learners, expanding their focused group of enrolment to many other countries, and in return, benefit from the highly globalized learning that the internet and diverse students has got to offer. Furthermore, these objectives can be met without the need to build new buildings and classrooms. With this said, the profound disparities existing between how higher education is structured and the need of learners have to be rechecked. The structure of two to three semesters per academic calendar practiced in the 20th century seems obsolete to the current availabilities of online learning and accompanying technologies. In the current century, student is free to learn and go through the courses wherever there is an access to the Internet, allowing eager and competent students to complete studies at a faster pace. This also complement the restrictions on funding due to the new economic environment, where more students can be graduated earlier and freeing up space for more students to be enrolled.

Moving forward, higher education has to adopt a robust model of sustainability- a fresh outlook on improve cost management, innovative delivery of higher education, and a more comprehensive understanding of what students' needs are. The changing landscape discussed in this chapter, such as MOOC and the pedagogy accompanying it, together with strategies such as gamification met the above when done right. Higher education institutions has to be flexible enough to adapt to new changes to remain competitive and relevant to students.

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Embedding Gamification Approach in Education

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Abstract : The process of memorizing too many terminologies and technical facts for most of courses can be difficult for students and lecturers as it requires students to recognize and comprehend the concepts very well. It has become a big challenge for both students and lecturers to achieve the same learning outcomes of the courses as different students have different learning styles and preferences. Hence, this chapter is written purposely to reviews the previous studies in exploring the current teaching and learning practices that embraced the gamification approach in education. This chapter also discovered the features of gamification to be considered by the lecturers for ensuring the gamified activities and products designed are suitable to be used in educational environment. Also discussed and explored in this chapter are the advantages of embedding gamification elements in teaching and learning environment.

INTRODUCTION

Using games to support learning process is not a new approach whether online or offline based. Kiryakova et al. (2014) summarized that gamification is the integration of game elements and game thinking in activities that are not games. Nah et al. (2013) highlighted the benefits of gamification obtainable by students such as improving motivation for students to learn more, allowing repeated failures which permit students to learn new things and tolerating behavioural change as the students experience learning process in variety of environments and settings offered by gamification. By applying some features those included in a gaming application such as user, challenges / tasks, points, levels, badges, ranking, a new model can be developed to make the teaching and learning more fun and engaging. Positive and rapid feedbacks in gamification also help student gain motivation to study and stimulate positive and entertaining learning process (Muntean, 2011). Nowadays, the advancement of technologies gives big

opportunity to institutions to produce high quality educational games that can be used to improve students' understanding in the subject matter yet entertaining at the same time. A study by Bajko et al. (2015) that using quantitative data revealed that most of students were not only engaged when using gamification elements in their curriculum course, surprisingly also willing to do extra preparation for the course although the students' performance is still unmeasured.

GAMIFICATION IN EDUCATION

Most of the time, students find it difficult to learn new course with a lot of terminologies to be comprehended and memorized. They always confront unfamiliar technical terms and are required to memorize and visualize certain processes such as what happen in the computer's memory (Khaleel et al., 2015) in computer science course. Weak students feel a burden and end up memorizing the processes without understanding the terms and the process involved. This situation indirectly leads students to get low grades in the course. There are suggestions by some researchers to adopt an enjoyable approach in learning difficult subjects. Thus, studies have shown the application of gamification elements in websites do engaged users. A study by Laskaris (2015) concluded that students can remember 90% of the content if they involving or participating in the gamified educational materials or simulation, but they only can recall 10% of wen only reading, 20% when listening, 30% with visualized oral presentation, and 50% by observing someone explaining the content with some actions. It was also supported by a study conducted by Khaleel et al. (2015) in applying gamification features in programming language course as a new architecture of gamification application to increase the effectiveness of learning and enhance students' understanding.

Gamification is defined as the process of adding games or game like elements to something, such as a task, to encourage participation. In other words, gamification is the application of game-based elements to non-game systems (Wood et al., 2013). Gamification builds on established game-based approaches and an understanding of the nature of humankind, founded on behavioral economics and psychology, to allow system designers to achieve objectives. Gamification is applied in various disciplines to promote and

encourage certain behaviours (Wood & Reiniers, 2015). Hence, gamification is not about turning routine activities into a game but to redesign work processes with game mechanisms for a fun and enjoyable experience. Before we discuss about the roles of gamification in learning activities, it is necessary for us to identify the meaning of authentic learners as they would be involved in the gamified learning system. For authentic learning to occur, learners must be engaged in an inventive and realistic task that provides opportunities for complex collaborative activities. Herrington, Reeves, and Oliver (2010) defined authentic learning as providing an alternative approach that allows for an engaging and student-centered learning design. In authentic learning contexts, technology is used as a cognitive tool for problem solving and knowledge construction. Authentic learning takes place with technology instead of from technology (Herrington et al., 2010). Here, we can see that gamification elements would aid in the authentic learning process effectively.

The gamified learning systems are becoming more common within educational institutions although there is a lack of understanding on the elements of gamification that would influence either positively or negatively on the learning experiences of students using these systems. According to a study by Geelan et. al (2015), they found different results on examining the implementation of existing gamified learning tool within a university in Australia. A combination of motivational and game-based elements such as presentation of content, self-efficacy of learning experiences and feedback gave positive influences on the students. On the other hand, issues such as interaction flaws and compatibility have negatively influenced the learning experiences among students. They added that a combination of good game design supported by motivational and educational theory is a core element of success. In addition, student engagement with learning activities is an important aspect of the educational experience and contributes significantly towards learning outcomes. Nevertheless, critical elements such as the levels of organisational support, the preferences of students, the general perception of games and the ability to continuously improve and add to the game are needed in order to maintain novelty, and extend the positive experiences.

Martinovic et. al (2013) claimed that children learning processes and outcomes could be improved via gaming. It means that the strengths and weaknesses of the child may also be identified to provide feedback for

improvement of learning and outcomes. In their study, they developed methodological tools to distinguish different types of cognition that are involved in playing simple single-player games and to connect them to player's attributes that could be verified and measured during game play. They also showed various ways in which computer games may be used throughout life to achieve certain goals like reduced memory loss, improved reaction time, or improved understanding of subject-related concepts.

The design of assessments within virtual environments to aid in authentic learning, supported by gamification elements were discussed in a study conducted by Wood et. al (2013). They investigated the elements that support the assessment design such as rewind, ghost images, save points and multiple lives, and time and space control. The merging of the game elements with the authentic learning tasks in the same context would not create biasness in the participants' perception towards achieving badges but working towards overall objectives. Hence, a careful design on the gamification mechanisms is crucial to ensure an effective implementation.

FEATURES IN GAMIFICATION FOR EDUCATION

Embedding gamification approach in education is where the students can experience as they are playing games those have been translated into educational context thus helping the learning process become more interesting and influencing. The designing process for developing learning materials that embedding the gamification approach needs to be well-planned to make sure the gamified products successfully fulfilling the learning outcomes for the topics as well as including features that can attract the students to continue learning. According to Kiryakova et al (2014), the objectives or the learning outcomes of the course will determine which features to be included in the gamified learning materials. Previous researches on gamification approach for different levels of education discovered that features those are usually included in gamification for educations are recognition for players' achievement, offering rewards, having good and interesting storyline, time, personalization, interaction and have fun and learning orientation.

i) Achievement

Typically, people will feel satisfied after they have performed or fulfilled certain achievement in their life. This achievement will motivate them to keep on improving their current condition. In most of games, the progress or score for players will be determined by level. Usually it starts with level 1, followed by level 2, level 3 and so forth and the players need to complete one level after one another. The satisfaction feeling after accomplish certain achievement in one level will be a drive factor to players to move on next level which will be more challenging than previous one. Moving to next level requires players to be more prepare with higher confidence level and motivation to play as the games will test more skills and knowledge of the players.

Therefore, when this element has been applied in gamification for education, it will increase the motivation to learn among students so that they can accomplish the level and perform well in the games. Besides, it also may improve their fear of failure and confidence level.

ii) Rewards

Everybody likes rewards and it can be a good factor to motivate people. After players has completed certain task or level with a good score or they have accomplished special achievement, the players will be granted with a certain rewards. These rewards may be in forms of badges, bonus points or stickers. Collecting these rewards will signify the players' progress along the game.

In gamification for education, players may be rewarded after they have completed certain tasks or levels of game. Rewards also may be given on their special or unexpected achievement. Players may be motivated by these rewards and will perform and do their best. Along the way, they will ensure themselves with the knowledge to collect more rewards and of course to win the games.

On the other hand, Sonts (2013) mentioned that, in gamified activities, rewards should not be the main elements since gamification is more on application of games mechanism into non games context instead of collecting pints and scoring. Besides, too much rewards can be a distraction to achieve the the main objective of gamification in education. Students will

focus more on winning the rewards instead of focusing the course content. In addition some students may refuse to learn without these rewards.

Hence, giving rewards is important in gamification but it should not be overused and become the main factor in gamified activities.

iii) Storyline

Gamification educational products having a storyline embedded with variety of characters provides more interesting environment and settings. The idea can be expanded for suitable theme and storyline that can be fictions or inspired by real life situation. Most of mathematics, statistics or economics games contained exercises that have been found in the exercise books that has been added with the graphics or modified into games environment. Therefore to ensure that it able to capture student's interest, the exercises may be designed with a storyline that makes it more fun.

As an example for mathematical courses, instead of completing the exercises, the player may be given a storyline that they trying to save a princess that lived in a locked castle by 10 layer doors. Therefore, the player needs to complete all exercises for each layer to open the 10 doors. In completing the objective to save the princess, the player or students must be able to answer all the exercise which will test their knowledge and skills. The feeling of excitement and satisfaction will come along the way and it will become the motivation factor to complete the game with good score as well as improving their knowledge on the course itself.

iv) Time

To be more effective, gamification needs to be completed within certain time frame. This will give students time pressure in playing the game. However, this kind of activities can encourage students to be more timed-objective and enhancing students' time management skill. They will tend to focus on the activities or tasks given to ensure that they can accomplish the mission within the time given or getting high scores for minimum time spent.

v) Personalization

Every people have different characters, skills and preferences. Gamified educational and penalties, materials can be more interesting when it allows players to customize their own preferences or has the personalization elements. A player will be tested at right level in the right way. For example, the player will has options to choose their own character to be used in the game and choosing settings and user interfaces that they prefer. It will make the player happier and enjoy in completing the tasks and levels given.

vi) Interaction

Interaction is a feature that allows students to feel involved in the games environment when they obtained responses during and after performing particular tasks, in form of messages, scores or rewards and penalties. A good gamification for education is when it provides interaction with the students and makes the students to come and play again. As the students enjoy with the gamified materials and able to embrace the benefits of it, consequently it will brings the satisfaction to the students and the lecturers when both enjoyment and course learning outcomes successfully accomplished.

vii) Fun and learning orientation

The main objective of lecturers to shift from traditional teaching approach to gamification approach is generally to capture the students' attention and motivation to learn. The former method believed to be dull, unattractive and boring. Therefore, by applying gamification approach in teaching and learning activities, it believed that it will provide more interesting way of learning. Using fun materials in learning activities is more attractive and able to capture students' attention.

In addition, fun in the learning process creates more peace and calm environment. Calm and peace environment will make students to be more relaxed and takes thing more easily in completing the tasks given. Hence, in applying gamification for education, we must ensure that the elements of fun exist although the main objective is to improve student's knowledge and skills.

ADVANTAGES OF USING GAMIFICATION APPROACH IN TEACHING AND LEARNING ACTIVITIES

Many of the studies indicate that gamification provides benefits and positive effects in the teaching and learning process. Based on the growing numbers of papers published on gamification, this suggests that gamification is becoming a more popular subject for academic inquiry.

i) Increase Motivation and Engagement

Currently education system has become quite challenging to motivate students to learn. The teachers or lecturers should make learning more interesting and students are interested in attending the class or lectures. Schools or universities management are concerned for student's attendance to the class or lectures by monitoring the students' attendance. Gamification approach motivates students to study and attend classes or lectures. In fact, gamification directly affects the students' engagement and motivation and it indirectly leads to acquiring more knowledge and skills. According to Rashid (2017), gamification has worked to motivate the students to take part in the activities and engage the students in all the education processes irrespective of their performance in the class. While Chapman and Rich (2017) studied on the motivational impact of specific game elements and how to form student motivational styles in educational gamification. They identified four motivational styles in educational gamification; personal progress, competition and praise, individual assignments and group work. Studies by Ibáñez et al. (2014) have shown positive effects on the engagement of students towards the gamified learning activities. The most successful mechanism to foster engagement was collecting badges especially among other game mechanics elements. Same with Muntean (2011) concludes that, the important metric for success in gamification is engagement.

ii) Fun and Enjoyable Experience

Refer to the experience of students in working with gamification, they were happy, and enjoyed the activity. Besides increased motivation and engagement, gamification provides enjoyment over the students. Perrotta et al. (2013) found that majority of teachers believed that gaming could help support children's cognitive development, their ICT development,

and their higher-order thinking skills. Huang and Soman (2013) stated that gamification serves the purpose of minimising negative emotions compared in traditional forms of education. Besides developing students' knowledge and skills, the learn-by-failure technique in games environment will drive the students to complete the tasks without the embarrassment factor. While Muntean (2011) claimed that gamification makes education more fun and engaging, without undermining its credibility. Overall, the use of game mechanics such as badges, points and leader boards made the course activities more enjoyable and fun discussed by Tan and Hew (2016). Many of the studies agree that statistically significant improvements in terms of increased motivation and task commitment and enjoyment are connected based on gamification.

iii) Increase Interest Level

The students obtained positive values by having gamification approach in teaching and learning and makes the course content more interesting. Most of the games work on rewards system which is usually known as PBL system; Point/Prizes, Badges/Achievements, and Leadership board. Thus, to achieve the rewards, the students must think like a problem-solver, innovator and critical thinker to overcome the challenge. Thus, this rewards system would make learning become interesting. Furthermore, gamification promotes healthy competition as anyone can earn points and badges provided they take part in the games which conducted as classroom activities. Besides that, Rashid (2017) found gamification increases engagement and creates a positive vibe. As the result, students are becoming more interested towards the learning process and be more competitive while learning with the rewards system.

iv) Emerging Technologies for Teaching and Learning

As instructors or lecturers, it is the time to improve traditional educational tools and approaches such as lectures, discussions, lab reports, tests, and textbooks by developing gamified materials in helping students overcome the learning difficulties in classroom. Johnson et al. (2014) identified the emerging technologies that are bound to have a significant impact on learning, teaching and creative thinking in higher education. This technology involved gaming and gamification whose impact on education

as well as the real presence of these key trends in university training contexts. Therefore, it is important to work gamification into initial training in education process to enhance their future professional performance. Hamari, Koivisto and Sarsa (2014) mentioned that, most of the studies of gamification approach based on education or learning contexts. The most popular example learning contexts nowadays are e-learning and Massive Open Online Courses (MOOCs) environment. Gamification in e-learning or MOOCs provide an effective, informal learning environment, and helps learners practice real-life situations and challenges in a safe environment. Study done by Glover (2013) stated that the principles of gamification are mostly derived from computer games and have some online element. However, gamification can be also applied to non-electronic contexts.

v) Encourage Feedback and Social Connections

To facilitate better learner engagement, gamification encourages instant feedback so that students know what they know or what they should know. For example, students will try the quiz or activity again and again to get a higher placement or creates motivation for further lesson engagement. Glover (2013) stated that good feedback should outline what the learner has done and give guidance on how to improve in the future. Study done by Muntean (2011) declared that the positive feedback from gamification pushed the students become more interested and stimulated to learn. Moreover, it can be a powerful booster to determine them to study more. Sometimes, to collaborate on challenges, the students must create team competitions. Therefore, the students indirectly make social connections with other students in their courses.

The gamification is very important to increase motivation and engagement among the students. It desires to combine intrinsic motivation with extrinsic to raise motivation and engagement. Moreover, gamification makes the learning and teaching process much fun and enjoyable experience either to students or teachers. It can be also being seen that the students were influenced by extrinsic rewards and increase the interest level when see their names on the leader board among toppers. Moreover, by using gamification it will emerging technologies for teaching and learning environment such an e-learning application and MOOCs. This is not limited to computer science students only but gamification approach provides an alternative means for

educators to engage any students during the teaching and learning process. Gamification also encourages feedback and social connections with other participants. Most of the students need to be engaged more to change from passive to active participant. Thus, gamification had a desirable impact on the students.

CONCLUSION

Gamification approach can increase students' engagement and understanding the terminology or subject matters as it requires different way of thinking to achieve the goals in the game environment. By implementing variety of teaching delivery methods such as written assignments, group discussions, presentations, and quizzes conducted during lecture sessions, the methods can also be supported by improving the learning materials. The students also can keep the contents longer in mind since gamification can constitute a great progress as they experienced in the game environment themselves. A study done by Sandunsky (2015) discussed on the impacts of gamification in classroom and reveals that using simulating environment to students is significantly enhance student's motivation and engagement and by incorporating gamification in e-learning, it can helps students remember 90% of the content thus will help in memorizing terminologies.

Turan et al. (2016) also investigated the effect of gamification on students' achievements, cognitive load levels, and perceptions. A gamification-based strategy was also compared with traditional methods in their study. From their study, the experimental group students, who were taught using the gamification approach, earned better achievement scores than the control group students. The positive result could be influenced by the suitable design and content of the gamification process as well as by the high average age in the study samples. Turan et al. (2016) conducted a mixed method study and according to the qualitative data obtained in the study, the students gave positive attitudes towards gamification strategies and wanted other lessons to be taught via this method. They concluded that gamification can increase both cognitive load and achievement levels, and students generally have positive thoughts regarding gamification strategies. When gamification is applied, the cognitive load factor must be considered and certain precautions must be taken to maximize effectiveness.

Incorporating gamification features in educational materials discussed in this chapter will not only improving students' engagement towards the course content, but it eventually will upgrading the learning materials from the conventional learning tools into a refined materials with purposed learning outcomes. Learning materials can be enhanced and converted into education products by changing the representations of terminology into visual and embed the gamification elements to help both lecturers and students to accomplish the course learning outcomes. The delivery of the knowledge can be transform into interesting and interactive environment that can be an addictive learning process for the students. Adopting the idea of learning by failure approach and enthusiasm to earn points in game environments, the learning materials will gradually develop students' good attitude and behaviour such as teamwork and leadership as well as giving them motivation to learn the contents of course. The learning materials can make teaching and learning more fun and engaging students with the contents and consequently improve students' performances for the course. As for the lecturers, gamification approach will add a new teaching methodology that not only can improve students' performance and engagement during knowledge acquisition process, but also give motivation to them to complete the game and promote good behaviour among students as they experience competitive learning situation. Gradually, it will affect the performance of the students towards the course contents and generate environments for effective learning process.

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Gamification: Which elements are effective for instructional games?

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Abstract : It is empirically evident that the application of gamification in instructional games has positive impacts on learning. Ahmad and Aziz (2017) revealed the potential of applying the Bloom's Taxonomy as game levels for gamifying instructional games, thus they can be used as a tool for assessment of performance for gauging students' learning progress. Borges et al. (2014) reported that studies on gamification that focus on how gamification can be utilised to boost learning, increase students' motivation and enhance students' skills. Seaborn and Fels (2014) revealed that it improves interactivity through gameful learning experience. Hamari, Koivisto, and Sarsa (2014) discovered that it has positive impacts depending greatly on the context and users in which it is applied. Stott and Neustaedter (2013) indicated that it is significant to promote engagement, but its application in education is particularly sensitive to context. Therefore, identify the right gamification elements for instructional game in order to ensure optimal learning takes place is essential.

INTRODUCTION

Research investigating on the application of gamification has rapidly grown since its emergence in 2005 (Dale, 2014). Therefore, this paper is aimed to evaluate the effectiveness of gamification elements in instructional games that promote learning based on the empirical evidence from prior studies. The research questions for this study are as follow:

1. What gamification elements are use in instructional games?
2. How gamification elements in instructional games promote learning?
3. Are gamification elements used in instructional games effective for learning?

INSTRUCTIONAL GAMES

A game is defined as an activity that occurs in the imaginary world that does not have any effect on the real world, and anything happens in the game

is irrelevant to any contexts outside the game (Garris, Ahlers, & Driskell, 2002). The design of games involve specific game elements. There are no specific game elements that are accepted. Thus, different scholars or researchers suggested different game elements (Garris, Ahlers & Driskell, 2002; Stott & Neustaedter, 2013; Dale, 2014). The game elements from different scholars or researchers are tabulated as follow:

Table 1 : Game Elements by Garris, Ahlers and Driskell (2002), Stott and Neustaedter (2013) and Dale (2014).

Scholars/ Researchers	Game Elements
1. Garris, Ahlers, and Driskell (2002)	<ol style="list-style-type: none"> Fantasy: The game context is not real and does not have any connection with the real context). Rules/goals: There are rules governed a game such as fixed space, duration of time and rules. Sensory stimuli: Another type of reality that is against normal sensations and perception need to be accepted temporarily. Challenge: A game contains activities that are not too easy and not too difficult that is achievable. Mystery: A game stimulates curiosity that is not too easy and too difficult to be solved. Control: A player can regulate, direct, or command something in a game.
2. Stott and Neustaedter (2013)	<ol style="list-style-type: none"> Freedom to fail: provide multiple lives, or allow players to restart at the most recent 'checkpoint'. Making mistakes is part of learning process and they can explore content, involve in decision making and realise the effects of taking the right or wrong decision. Rapid feedback: provide frequent feedback that is crucial in informing learning progress. Progression: provide levels or missions in order to increase their motivation. Storytelling: provide narration or telling stories. It has positive impacts on learning by making learning elements more realistic, thus it can enhance engagement.
3. Dale (2014)	<ol style="list-style-type: none"> Achievements: provide experience points, levels and bonuses Exercises: provide challenges and discoveries Synchronizing with the community: provide leaderboards and collaboration Result transparency: provide experience bars and continuous feedback Time: provide countdown and speed Luck: provide lottery and random achievements

Instructional games are any games that are played for educational purposes. They can be conventional or digital. Digital games are commonly known as computer games. As for computer games, they can be played online or offline. For the purpose of this paper, instructional games are defined as online computer games that are played for educational purposes. The design of instructional games also include the game mechanics that are termed as gamification because the elements are applied in the non-game context in order to make them more game-like (Kapp, 2012). Gamification elements used in the design of instructional games are described in the next part of the paper, Gamification.

The field of instructional games has rapidly been growing and evolving. Consequently, the interest among scholars to investigate the application of instructional games in learning has increased tremendously. Prior studies indicated that they promote learning such as providing enjoyment (Arslan, Moseley, & Cigdemoglu, 2011; Lombardi, 2012; Ang, 2014; Khenissi, Essalmi, & Jemni, 2015), enhancing motivation (Anyaeibu, Ting, & Li, 2012; Eseryel et al. 2013; Schouten et al. 2014), improving the acquisition of skills/ knowledge (Connolly et al. 2012; Nadzrah & Nosratirad, 2013; Scepanoviv, Zaric, & Matijevic, 2015; Santana & Panamericana, 2015) and increasing engagement (Fishman, 2012; Kiili et al. 2012; Nicholson, 2014) and supporting different learning styles (Schaaf, 2012; Bellotti et al. 2013; Soflano, Connolly, & Hailey, 2015). Therefore, it is significance to investigate what makes instructional games effective for learning as with regard to this paper is the gamification elements.

GAMIFICATION

According to Dale (2014), the word “gamification” was included to the Oxford Dictionary’s word of the year shortlist in 2011. The meaning provided by the Oxford Dictionary for it is ‘the application of concepts and techniques from games to other areas of activity’. However, researchers define it in many ways. Kapp (2012) defined it as the application of game-based mechanics, aesthetics and game thinking in engaging people, motivating action, promoting learning, and solving problems. Seaborn and Fels (2014) stated that it is the application of elements and mechanics of games in non-game settings. Caponetto et al. (2014) described it as the use

of game mechanisms in non-gaming environments in order to improve the processes performed and the experience of those involved. Sailer, Hense, Mayr, and Mandl (2017) explain gamification as the process of applying game design elements in non-game contexts in order to make them more game-like.

Gamification permit learning to be more interesting, appealing and eventually, effective (Caponetto et al., 2014). It also has the potential to engage and motivate students in learning (Kapp, 2012). Thus, we define gamification as the application of game elements and mechanics in the design of non-game activities with the purpose of making them to resemble as closely as possible to games.

According to Kapp (2012), there are two types of gamification. They are structural gamification and content gamification. Structural gamification only gamify the structure around the content without changing the content itself. Its purpose is mainly to trigger students in reading the content and engage them in learning. Content gamification is the application of game elements and game thinking in order to change the content to become more game-like. Thus, the content is delivered through context or activities within games. Typical gamification elements as stated by Dale (2014) and gamification elements according to learning objectives as presented by Kapp (2012) is shown in Table 1 and Table 2 respectively.

Table 2: Gamification elements by Dale (2014)

Gamification Element	Objective
1. Points	To reward specific high value behaviours and achievements
2. Achievements	To give positive reinforcement for high value user behaviours
3. Levels	To indicate engagement levels and perform as entries into new challenges
4. Missions	To form a set of behaviours that will lead users to unlock specific rewards
5. Contests (a set of missions)	To provide rewards to those who complete most quickly or effectively
6. Leaderboards	To introduce competition by ranking the achievement of players
7. Notifications	To increase players' engagement when they do a required action
8. Anti-Gaming Mechanics	To determine how frequent to reward a behaviour

Table 3: Gamification elements by Kapp (2012)

	Gamification Element	Type of Gamification	Learning Objective
1	Points , badges	Structural gamification	To encourage students
2	Rewards	Structural gamification	To motivate actions
3	Badges, ranks, rewards	Content gamification Structural gamification	To influence behaviour
4	Points, rewards	Not mentioned	To drive innovation
5	Levels, badges, points	Not mentioned	To develop skills
6	Points, Story, levels	Not mentioned	To acquire knowledge

It is certainly impossible to include all gamification elements in one instructional games. Furthermore, there should be a balance between gamification elements that make instructional games enjoyable and educational elements for achieving the desired learning objectives. Therefore, it is crucial to identify gamification elements that have been used in designing instructional games, examine how they promote learning and whether they are effective in promoting learning.

METHODOLOGY

The search was limited to the papers published from 2013 to 2017. Advanced search was carried out by using two key words: gamification and elements. Papers were selected based on three criteria which were:

1. The papers could be accessed for free.
2. The papers had to be on experimental studies focused on studying the effectiveness of specific gamification elements.
3. The papers were full paper journals.

Selected research papers were analysed in order to identify gamification elements that were used in instructional games, examine how gamification elements in instructional games promote learning, and whether the gamification elements used in instructional games effective for learning.

RESULTS

There were 610 results obtained from the search. However, only six papers were relevant based on the criteria mentioned in the methodology. This is due to many papers only reported on the application of gamification in general. Only six papers focussed on specific gamification elements that affect learning. The analysis of the related papers are tabulated in Table 4 and Table 5:

Table 4: Source, sample and gamification elements studied in the research papers

	Author and Year of Publication	Sample	Gamification Elements
1.	Landers et al. (2017)	339 university students	Leaderboards
2.	Mekler et al. (2017)	273 aged 17 to 68 years old	Points, leaderboards, levels
3.	Nebel et al. (2017)	103 university students at the degree and master levels	Leaderboards
4.	Sailer et al. (2017)	699 with the average age of 22 years old	Badges, leaderboards, Performance graphs
5.	Prestopnik and Tang, (2015)	27 participants aged between 18 to 22 years old	Storytelling, rewards
6.	Ramirez et al. (2013)	9 to 10 years old children	*Rewards

Table 5: Results of the paper analysis

Gamification Element	Source	Learning Impact	Conclusion(s)
1. Badges	Sailer et al. (2017)	Positive	It has an effect on competence need satisfaction and perceived task meaningfulness.
2. Leaderboards	Landers et al. (2017)	Positive	It was motivating in term of players set goals in the games.
	Mekler et al. (2017)	Positive	It increases intrinsic motivation and is effective means in enhancing the quantity of performance.
	Nebel et al. (2017)	Positive	It provided competition though social comparison.
	Sailer et al. (2017)	Positive	It has an effect on competence need satisfaction and perceived task meaningfulness.
3. Levels	Mekler et al. (2017)	Positive	It increases intrinsic motivation and is effective means in enhancing the quantity of performance.
4. Performance graphs	Sailer et al. (2017)	Positive	It has an effect on competence need satisfaction and perceived task meaningfulness.
5. Points	Mekler et al. (2017)	Positive	It increases intrinsic motivation and is effective means in enhancing the quantity of performance.
6. Rewards	Prestopnik and Tang, (2015)	Positive	It made the games enjoyable.
	Ramirez et al. (2013)	Positive	It was engaging and motivating.
7. Storytelling	Prestopnik and Tang, (2015)	Positive	It was attractive and engaging.

DISCUSSION

There were limited studies obtained from the search results from Science Direct for the duration of year 2013 to 2017. The results contain Research on gamification elements is considered relatively new as the idea of gamification was introduced in 2005 and gained its popularity in 2010 (Dale, 2014). Furthermore, the number of research on specific gamification elements is very limited. Four research were very recently published in the year of 2107, and the other two papers were also quite recent as they were published in 2015 and 2013. Since only six papers were obtained, the

analysis is inadequate as it cannot be carried out in depth and only limited to the gamification elements studied in the paper. Thus, other gamification elements may be beneficial for enhancing learning and need to be explored.

There are seven gamification elements identified in the studies namely badges, leaderboards, levels, performance graphs, points, rewards and storytelling. All gamification elements used in the design of instructional games indicate positive outcomes toward learning especially in enhancing motivation, enjoyment, performance and task meaningfulness.

Implications of The Studies on Instructional Game Design

The brief overview of the related studies proves that gamification elements are significantly important not only to promote engagement but also to support learning. It is impossible to include all gamification elements in any instructional game and the elements incorporated cannot match with learning needs for all students. Furthermore this may cause several consequences: a longer time to develop, more cost to be invested and students require a longer loading time to play the games with many features. Therefore, instructional game developers need to decide which gamification elements are suitable to promote optimum engagement and learning for different students' learning needs. The decision may be based on:

a) Types of courses

Courses can be categorised into Science, Technology, Engineering, Mathematics, Health and Languages (Boyle et al., 2016). Other Social Science courses may be grouped under one category.

b) Learning objectives

The Bloom's Taxonomy can be applied as guidance in the game development such as by dividing learning objectives into cognitive levels: Remember, Understand, Apply, Analyse, Evaluate, Create (Munzenmaier & Rubin, 2013)

c) Competency level

Classes are commonly consisted of mixed-ability students in term of cognitive ability and skills. They can be grouped at least in three categories:

good, average and poor. Hence, instructional games should be able to have gamification elements that can cater with these groups of students.

d) Learning style

The development of instructional games should always consider different learning styles of students. For example, Fleming (1995) classifies learning styles into three types: visual (learn by eyes), auditory (learn by ears) and kinaesthetic (learn by touch, hearing, smell, taste and sight). Hence, visual learners may prefer graphical presentations; auditory learners may prefer audios, sounds and music; and kinaesthetic learners may prefer instructional games that provide experience related to real life such as solving puzzles and simulations.

Customization of instructional games can benefit both the game developers and students. Game developers can reduce the gamification elements that can only benefit the target students who will utilise the games. This may lead to reducing the time and cost for developing instructional games. While students can get instructional games with the features they prefer and as the gamification elements are reduced, they will require less time to load the games with less features.

However, there are still limited studies that focus on specific gamification elements for specific purposes. Therefore, it is an urgent need to conduct studies to investigate specific gamification elements for specific purposes. Based on the review of literature, the following gamification elements in Table 6 are considered important to be researched on separately in order to provide more empirical evidence on how each element can impact engagement and learning.

Table 6: Important gamification elements for instructional games

	Gamification Element	When/ How to use	Learning Objective
1	Points	Players are awarded when players achieve desired learning outcomes	To inform learning progress/ achievement
2	Badges	Players are awarded when players achieve specific high value behaviours and achievements	To increase motivation
3	Leaderboards	Players are ranked according to the current achievement	To introduce competition
4	Notifications	Players get notifications when they do a required action	To increase engagement
5	Timers	Players are provided with a timer such as countdown.	To create challenge
6	Levels	Players enter the next level after completing the lower level.	To develop skills
7	Lives	Players can repeat games after they fail to complete it.	To provide freedom to fail
	Storytelling/ Narration	To provide realistic learning elements	To increase engagement
6	Feedback	Players are supplied with feedback after completing a task.	To inform learning progress/ achievement

Research can be conducted through various methods such as qualitative: one-to-one or focus –group interview, classroom or program-session observations, programme documents and audio visual materials; quantitative: true experiments, quasi-experiments, single-subject design, correlational design, or survey design; or mixed methods: combining both qualitative and quantitative that enables researchers to obtain two types of datasets: quantitative and qualitative (Clark & Creswell, 2015). Qualitative data can be analysed manually or by using a computer. Several types of software such as Envivo and Atlas.ti are noticeably useful to help researchers analyse large qualitative data. While quantitative data can be analysed by using the first generation statistical techniques such as Statistical Package for the Social Sciences (SPSS) or the second generation statistical packages which apply Structural Equation Modelling (SEM) such as SEM Amos and Partial Least Square SEM (PLS SEM). Researchers in social sciences have commonly used first-generation techniques, but they has gradually

preferred to use SEM as it is able to overcome the weaknesses of the first generation statistical techniques such as it enables multivariate analysis that statistically analyse multiple variables simultaneously and it can also measure unobservable variables.

CONCLUSION

Since the number of research on specific gamification elements is limited, it is important to investigate specific gamification elements that meet with students' learning needs, are able to engage them in the learning activities and enable learning to take place effectively. It is also crucial to identify which gamification elements reduce the time, cost and effort in designing effective instructional games. It is hoped that more specific studies will be conducted in the future in order to benefit most from the application of gamification elements in the instructional game design.

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Gamification: Which elements are effective for instructional games?

Teaching with MOOC: Conducting Programming Courses for Undergraduate Students

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Abstract : Technologies adoption in learning has given opportunities that may support practitioners and learners as well as learning institutions to empower their learning implementation with the current technologies available. From e-learning concept towards the cloud learning implementation nowadays, it has shown significance of having technologies in learning implementation. For the practitioners views of implementation, technologies adoption will provide various platform of learning resources to be adopted by the practitioners to the learners to learn. As for the learners, the opportunities of having technology will help them in managing their individual learning platform. Instead, learners may use the technologies in learning to learn at anytime and anywhere with support by their own learning platform created.

INTRODUCTION

Previous studies in having various technologies in learning implementation has shown significant impact using the technologies that will help practitioners and learners to empower their learning into new paradigms (Norazah et.al,2016; Saidatul et.al, 2016). Therefore, with the new online learning platform as in web and cloud environment, various learning applications available to be adopted by the practitioners in their learning implementation. Example of online learning platform available nowadays include YouTube, Microsoft 360, Google Drive, Powertoon, Wikipedia and others has being designed to give more choice for the practitioners and learners to empower their teaching and learning implementation. The current use of open online course with Massive Open Online Course (MOOC), this open online course platform has being created to empower learning that share the learning resources in open mode towards various learners in the world. In Malaysia education environment, the Ministry of Higher Education (MOHE) has Malaysia Education BluePrint (2015-2025), with one of the concentration is focusing in online globalised learning. This initiative will guide the higher learning institutions to have a strong learning platform that acquire the learning process to be access globalised by the various learners in the world. This strategies emphasize the use of MOOC platform that need to be initiated by the respective public and private universities in Malaysia. Therefore, this paper will discuss our academic experience in designed selected technical course according to the teaching requirement and developed using MOOC platform. The development of MOOC platform will be discuss and follow by the impact of learners academic performance for control group (CG) and experimental group (EG) will be discussed to investigate the significance impact of adopting MOOC platform in our teaching and learning implementation.

BACKGROUND OF STUDY

Massive Open Online Course also known as MOOC are online course which offer the learning in a high-scale in participations (Masters, 2011; Stephen & Jan, 2012) and access through thousands of user at a single time access. In Malaysia education environment, the initiative of having MOOC platform has been initiated by the Ministry of Higher Education through Malaysia MOOC platform that will gather learning resource sharing among public and private higher education that will offer open learning among institutions,

practitioners and learners. The most important benefits of using MOOC in teaching and learning is to introduce the use of technology in the classroom while transferring knowledge using the 'Open Learning' will empower learners to create their own learning as individual and institutions that will adhere quality in teaching and learning that able to share the resources to the other learners and institutions through the platform.

In the development form of MOOC, there is no specific development strategies available that will guide the practitioners and learning institutions to create and develop their MOOC platform. As for Malaysia education practices, the development of MOOC is depend on the higher learning institutions to decide. As for now, some research initiative to investigate the impact of using MOOC platform in some non-technical courses. Saidatul et al. (2016) studied the factors of teaching and learning outcome for TITAS course in using MOOC which the findings emphasize on learning activities that will determine the success implementation and delivery of MOOC. Hence, the acceptance of MOOC among students is merely contribute by the positive perception that will create the learning to be enjoy, fun and allow learners to be more focus in their learning (Abdul Fatah et al., 2015). Towards the implementation of MOOC in learning, various factors may contribute to the success experience in using MOOC platform to support teaching and learning. Norazah et.al (2016) and Shahrman et.al (2012) had discovered factors that will ensure the MOOC success implementation which emphasize on learners attitude, self-efficacy and anxiety with positive impact in the overall perception for each factors being study and this findings support the impact of MOOC technology that will allow Malaysian learners to enjoy learning with technology to support their learning implementation.

With MOOC platform, various learning resources can be embedded in the platform in a various forms of resources such as 2D and 3D animations in notes and video, real-time blogs for group discussions (Norman et al., 2014; Embi & Nordin, 2013; Nordin et.al, 2016). With such variety features provided in MOOC, this will empower the practitioners in the development of MOOC which allow more benefits learning resources to be added that will benefits and guided learners who had difficulties in learning as well mentor in their learning (Ryberg & Christiansen, 2008). Therefore, the MOOC creation as a new online learning tools that will provide benefits to the learners as well as practitioners, it also benefits the learning institutions who

had start adopting the MOOC platform that will also address the Malaysian learning strategies and concept to the other side of the world that can share the experience that Malaysian have to be access as a global online learning.

The Design and Development of MOOC platform

The design and implementation of our MOOC platform in general is shown in Figure 1 while the development of MOOC platform varies among learning institutions and practitioners. Norazah et al. (2016) has introduced the ADDIE framework which consists of phases which are analyse, design, develop, implement and evaluate. Therefore, for this research we use ADDIE framework in developing our MOOC platform for technical course in programming as illustrate in Figure 2. In our previous implementation of teaching and learning, we have to design the teaching and learning strategies according to the scheme of work provided for a particular courses. Most of the design has been done manually. This is part of autonomy being given by the learning institutions to the practitioners to plan their own teaching and learning strategies which include the learning resources and materials and assessments. As in our MOOC platform design, we include additional assessment requirements consists of assessments and activities which will be include as online access in MOOC platform. The online notes consists of syllabus structure according to the chapter for the selected course. In addition, for MOOC platform design we had include additional assessment consist of online assessment and activities. The online assessments will include gamification for a selected topics. The gamification is the concept of having gaming in learning which can be apply during the learning process either during the traditional or online learning implementation. For this research, we had select Kahoot! Game to be include into our MOOC platform. The game will take three (3) to four (4) minutes to complete and it must be done at the end of the class or during the non face to face session as implemented in our Blended Learning (BL) mode. As in MOOC platform, practitioners may also include student work gallery as this feature is included in the MOOC design platform. This student gallery will show student assignment or project submission work which include programming code exercise according to the selected technical topics in programming. In addition, we also include forum and discussion environment for students' discussion between learners and instructors as feature in MOOC platform

which allow learners to have collaboration and sharing information which can be apply at learners' convenience.

In order to improvise assessment in a MOOC platform, we also had include online activities which required learners to actively take part according to the activities. This online activities can be conducted during the Blended Learning mode which acquire learners to complete the task in the online activities. The online activities will be design according to the selected topics in programming but our focus is more in engaging learners with the programming code and features to determine output and input according to the programming code provided. In order to ensure learning continuity of using MOOC platform, we had also include file sharing features which acquire learners to share any relevant information which include video, text, URL link or any other resources according to the relevance topics in programming. In the real assessment of learners in MOOC platform, we have design set of assessments that will be used for the students to complete as a task. Every single assessments activities will consists of short quizzes, lab work tutorial which cater on the programming concept according to the selected topics and any others assessments that is relevant to the course. After the submission, learners work will be observed by the practitioners and include the feedback for each assessments. This will guide and help learners to identify any improvements as well as their ability towards the topics being evaluated.

Figure 1: The Design and Implementation of MOOC Platform

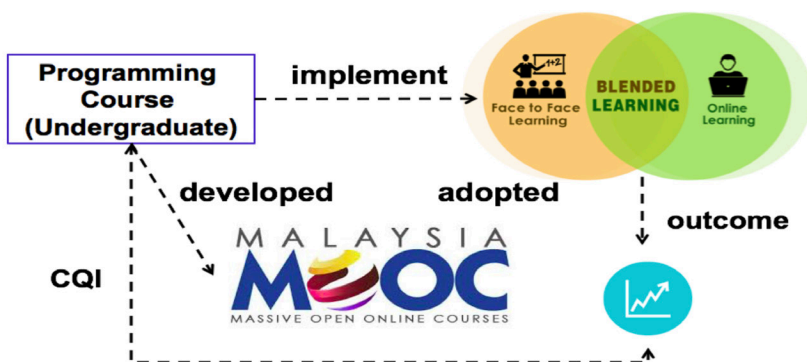
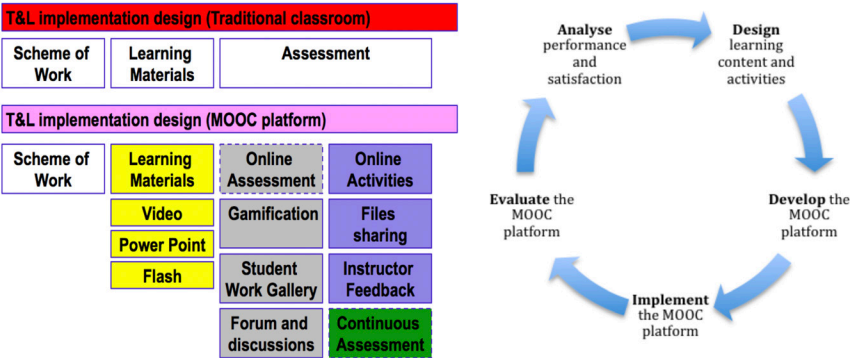


Figure 2: The Development of Course Structure in MOOC using ADDIE Framework



Implementation of MOOC Platform Participants

The participants of this research project were the semester two undergraduates students (N=75) at Universiti Teknologi MARA Pahang (Raub Campus) selected purposively for this study. The participants took programming course in Computer Organization with four (4) group of students enrolled into this course. For this research, we have coded the selected participants from two groups as experimental group (EG) while the other as a control group (CG). The EG will use the MOOC platform as learning conducted using Blended Learning mode while the other group will not involved in using the MOOC platform and using the normal learning mode which is traditional method of learning with face-to-face classroom and some online learning resources provided. The course structure for the programming course consists of six (6) chapters that consists of computer organisation topic with assembly language as the programming language use.

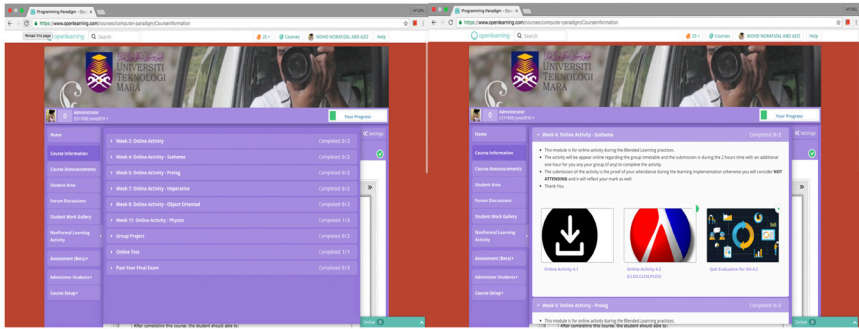


Figure 3: Example of Learning Resources and Activities created in MOOC Platform

The average age of the participants were around twenty one (21) with good level of ICT proficiency and skills as the learners is in the second semester of study. All the participants have not involved in any learning practices with MOOC or any others online learning environment previously. The class instructor also participated in this study. The instructor was responsible in teaching and learning over 14-week semester. The instructor have been involved in teaching the programming course for more than 5 years at the Universiti Teknologi MARA Pahang (Raub Campus).

RESULT AND DISCUSSION

This study employed learners performance result using the MOOC platform for the programming course according to the continual assessments and final examination result. The continual assessments consists of test , quizzes, lab work tutorial and project. For this study, we compare the learner's performance between the experimental group (EG) and control group (CG). The only different between both group is only EG will implement learning with MOOC platform with activity will be base in the MOOC platform while CG will implement the class as traditional class with lecture notes and activities will conduct during class. The findings will consists of learners performance for both group according to the assessment done for both group. The next section will describe the learner's performance according to the EG and CG.

Learners Performance in Final Assessments

Figure 4 show the comparison on performance between control and experimental group in final assessments that has been done during the respective semester. According to the diagram, there is three indicators being used which is average marks, minimum marks and maximum marks according to every questions in the final examination. The comparison between the groups in maximum marks has shown increase score by the EG in a subjective question 5, 7, 8, 9 and problem solving question 1 and 2 compare to the CG. However in objective and other subjective questions has show equal score for both group. While in average marks for both group, the increase of EG is only show in subjective questions 4 and 8 while the rest has shown no difference in average mark between the groups. While for the minimum marks score for both group has shown small differences and the EG has higher score in problem solving question 1 and subjective question 2 and 8 but not in the subjective question 3 which the EG score lower than the CG score.

Therefore, from this result we can see the overall impact on performance of EG using MOOC platform given positive significant impact on the performance as the learners enjoy the learning environment with MOOC platform as a new way of learning implementation. From the finding, it showed the positive acceptance of learners in using MOOC platform that will also reflect learners performance in their learning.

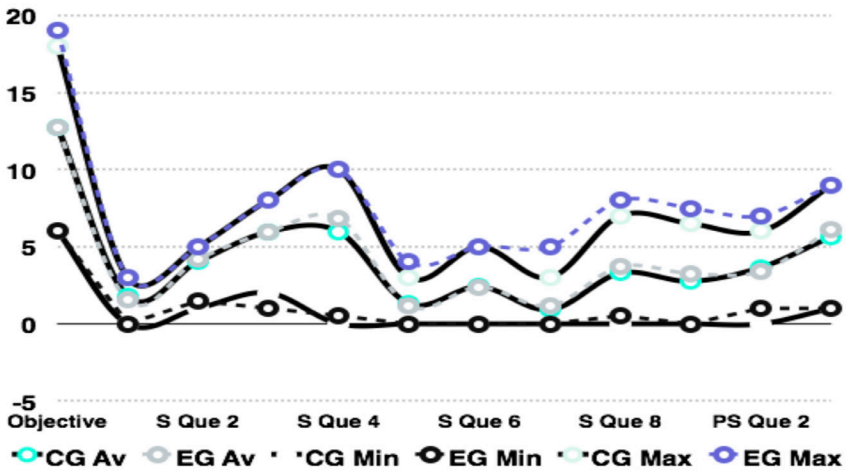


Figure 4: Learners Performance according to Final Assessment Components

Learners Performance in Continuous Assessments

Figure 5 show the learners performance according to maximum and minimum marks on continuous assessments. The performance of EG in ongoing assessments which consists of test1 and lab test has score lower in maximum marks but not in test 2 which the EG score higher compare to the CG marks. While in minimum marks finding, the difference between EG and CG group performance has show equal in Lab Test but not in Test 1 which the EG score minimum marks compare to the CG. However, in Test 2 assessment, the score for EG in minimum marks score higher compare to the CG.

Unfortunately, from the Total Ongoing Assessments (TOA) marks for both maximum and minimum, it has show the positive significance performance of EG while compared to the CG. The minimum and maximum marks for EG was more than 25 mark and 38 mark respectively has shown that learners in EG with MOOC platform score significantly higher while compare to the CG as in overall marks in the assessment.

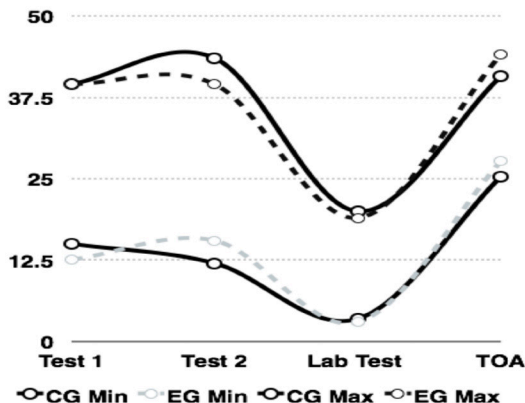


Figure 5: Learners Performance in Continuous Assessment

Learners Perception Towards Learning Using MOOC Platform

At the end of the semester, we had conduct a simple survey to discover the satisfaction level of learners towards the development and implementation of MOOC platform in their learning. For this purpose, we used secondary data provided by the University regarding the learners satisfaction towards the course implementation. The satisfaction was measured regarding the learners impressions towards learning using MOOC platform and learning activities provided in the MOOC platform. Most of the dimension of satisfaction of learners towards MOOC platform had shown positive significance as in average percentage. With MOOC platform, the learners agree on enhance learning ability, increase their knowledge, increase confidence level and also positive in using MOOC as learners platform in conducting and prepared their learning. Hence, the confidence of learners of using MOOC platform has increased positively as the learners agree to use MOOC platform as their new learning platform that will benefits their learning as well their knowledge and transferring of knowledge in their course.

Similar findings sighted in learning activities, learners are agreed to the questions and satisfied with the learning activities provided in MOOC platform for the particular course. The average of percentage score is more

than 90 for all three questions, had show the positive feedback provided by the learners towards the use of MOOC platform in their formal and individual learning. The most interesting findings of all, regarding the outcome satisfaction which the learners positively relate the activities provided in MOOC with their outcome as positive significance as the learning using MOOC platform had penetrate good vibration in achieving outcome of the course.

Table 1: Average of Percentage of Learners Impression and Activities in MOOC Platform

Dimension	Items	Average (%)
Impressions (LI)	LI1: The learning method using MOOC platform this course has enhanced my learning ability.	95.75
	LI2: My knowledge is increase from the resources provided in this course.	90.25
	LI3: My confidence level in this course has increased.	94.75
	LI4: I am confidence to use MOOC platform in this course.	91.5
	LI5: I felt anxious to use MOOC platform for this course.	67.5
Learning Activities (LA)	LA1: I am satisfied with the activities provided in MOOC platform for this course.	91.5
	LA2: I am satisfied with my outcome for the course.	96.75
	LA3: I am satisfied with feedback given for each online assessment activities.	91.75

CONCLUSION

Technology adoption in learning practices has given new opportunities for the learners and practitioners to improvise various learning resources as well as accessing learning easily by the connectivity of wireless and Internet connection. Therefore, the use of various new online learning platform has to be introduce to variety the learning paradigm by the instructors to the learners. This research has proven the positive significance of implementing MOOC platform in technical programming course for the undergraduate students. According to the learners' performance result and learners' satisfaction in using MOOC platform, the variety of learning with technology is able to support the success of knowledge delivery and penetrate outcome achievements for the particular course. The satisfaction include learning impression and activities which had shown positive significant as well as the students performances in continous and final assessments.

However, improvement and consideration on the learners anxious on using the MOOC platform shall be consider during the early process of learning using the MOOC platform. Brief introduction of MOOC platform as well as the significant of new learning platform being used shall be explain to the learners before purseu the lesson using the MOOC platform. This will give confident to the learners to use the MOOC platform in learning. It will also provide research opportunities for the researchers to investigate further regarding the factors on anxious towards the MOOC platform use and suggest relevant methods that will attract learners to use the MOOC platform in learning. As for another research opportunities regarding the research in the similar area of MOOC platform implementation, we suggest the investigation on MOOC platform use for other level of study which include the postgraduates and distcance learning. It also should consider the enviornment of learning which include the technical as well as non-technical course that use MOOC platform as their learning platform. The future findings for the suggest area may benefits the practitioners as well as learning institutions to observed different view of MOOC platform implementation as well as the improvement needed to further strengthen the requirements and research opportunities regarding the MOOC platform use in learning implementation that will empower learning and knowledge for higher education.

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